Remarks

Applicants have received and carefully reviewed the Office Action mailed June 4, 2007. Claims 1, 2, 4, 5, 8, 9 and 21-31 are pending. Claims 1, 4, 8, 21, and 27 have been amended, and claims 3, 6, and 7 have been canceled. Support for the amendments is found in the specification, claims, and drawings as originally filed. No new matter has been added. Reconsideration and reexamination are respectfully requested.

Rejection under 35 U.S.C. § 103(a)

Claims 1-9 and 21-31 are rejected as being unpatentable over Wise et al. (US 6,838,640), Rounbehler et al. (US 5,300,758), and Philips et al. (US 5,196,039). Applicants respectfully traverse the rejection. Independent claims 1, 21, and 27, as amended, recite elements not taught or suggested by the combination of Wise et al., Rounbehler et al, and Philips et al.

Independent claim 1 recites:

> 1. (Currently Amended) A fluid analyzer comprising:
> a pre-concentrator having a plurality of parallel channels; [[and]]
> a concentrator connected to the pre-concentrator; [[and]]
> a first separator connected to the concentrator;
> a second separator connected to the first separator;
> a first pump connected to the pre-concentrator; and
> a second pump connected to the second separator.

None of Wise et al., Rounbehler et al, or Philips et al. appear to teach or suggest such a device. The Examiner asserts:

> It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ more than one concentrator connected to one another, as taught by Rounbehler et al., modifying the fluid analyzer disclosed by Wise et al., thus providing means to permit rapid concentration of vapors (Rounbehler et al.: col. 2, lines 28-31).

Emphasis added; see page 9, lines 4-8 of Office Action mailed June 4, 2007. Thus, it appears the Examiner is asserting that one of ordinary skill in the art would have been motivated to combine Rounbehler et al. with Wise et al. for the purpose of permitting rapid concentration of vapors.

Applicants submit that no such motivation exists because Wise et al. already teach their device as including a multi-stage pre-concentrator 28, thus it appears concentration of vapors is already provided for in Wise et al. In particular, Wise et al. teach:

> The multi-zone temperature control adds this ability to do temperature programming at different zones independently, which is likely to improve the GC operation significantly. In that case, it will open a new era in fast gas chromatography.
>
> …
>
> To reach this goal, different temperature sensors will be placed along the channel length at each zone to provide the required information as feedback for a closed-loop controller. Additional desirable characteristics of the chromatograph system are low thermal mass for fast cool-down at the conclusion of the analysis and rapid temperature response to follow accurately the temperature program profile. Some solutions to achieve these characteristics have already been addressed and the rest will be discussed in the following section.

See column 6, lines 14-18 and 23-32. Wise et al. also teach:

> To overcome this difficulty, the use of distributed heaters is recommended to lower the response time and achieve a uniform temperature during the heating process.
>
> …
>
> For cool-down, a solution is to reduce the thermal resistivity to ambient during cool-down. It can be achieved by increasing the number of paths for heat dissipation. The method is to employ another structure consisting of an array of individual movable plates, i.e. microactuators.

See column 7, lines 5-7 and 29-31. Wise et al. also teach:

> The combination of multi-zone temperature control, very low mass and high heating efficiency, and rapid cooling/heating times make a microGC a powerful fieldable analytical instrument.
>
> …

> Multi-zone control provides the opportunity to reduce separation time and increase the channel efficiency.
>
> ...
>
> The use of CVD-sealed microchannels to achieve very low mass for rapid thermal cycling and high separation in gas analysis.

See column 8, lines 6-9, 13-14, and 28-30. It is not clear how adding additional concentrators to the Wise et al. device would provide means to permit rapid concentration of vapors over the means already provided by the pre-concentrator taught by Wise et al. Alternatively, if the Examiner is asserting that one would substitute a concentrator of Rounbehler et al. for that of Wise et al., there does not appear to be motivation for such modification.

It would appear that making the Examiner's asserted modification to the Wise et al. device would result in a duplicated structure. Applicants submit that there is no motivation in the cited references, common knowledge or common sense of a person of ordinary skill in the art to add the concentrators of Rounbehler et al. to the device of Wise et al. that already has a multi-stage pre-concentrator.

While Rounbehler et al. does teach their system of two series-connected vapor concentrators as permitting rapid concentration of vapors, Rounbehler et al. teaches that this is "achieved at high speed by electrical circuitry which provides rapid, precise heating of VC1, VC2, GC1, and GC2." See column 2, lines 32-34. Rounbehler et al. later describes the rapid, precise heating:

> The outer metal tube is also connected to a source of electric power for controlled, very rapid resistance heating of the metal tube- for example, from about 10°C. to 250°C. in about ***one second***. This very rapid heating, preferably accomplished automatically under programmed control...is continually monitored and employed as a feedback parameter in controlling the power applied to the tube

Emphasis added; see column 5, lines 3-11. Rounbehler et al. thus appear to teach a device in which sufficient power is needed to achieve very rapid heating (240°C in ***one second***) of the gas in order to concentrate the vapors. In contrast, Wise et al. teach "a low-power, battery-operated,

temperature-programmed fast μGC" to "achieve a temperature rise of 100°C in ***200 sec***." Emphasis added; see column 5, lines 33-34 and 26-29. The device of Rounbehler et al. thus appears to require a strong power source to achieve the very rapid heating required for the concentrators as opposed to the low-power, slower heating device of Wise et al. Applicants submit that in view of the significantly faster heating required for the concentrators of Rounbehler et al., one of ordinary skill in the art would not have been motivated to look to the teachings of Rounbehler et al. regarding a high-power, high-speed system, to modify the low-power, battery-operated device taught by Wise et al. Further, the low-power, battery-operated device of Wise et al. would not appear to achieve the very rapid, precise heating required to achieve the rapid vapor concentration of Rounbehler et al.

The Examiner states, "The fact that the power requirements are different from one Prior Art device to another is irrelevant." The Examiner appears to be considering that no matter how different power requirements may be and how different temperature change requirements may be between devices, all modifications would be necessarily obvious. Applicants strongly disagree. While minor changes in power requirements may be obvious, Applicants submit that the difference between the power needed to achieve a temperature rise of 100C in 200 seconds (Wise et al.) is significantly different that the power needed to achieve a temperature change of 10C to 250C in one second (Rounbehler et al.). Further, Applicants are not asserting that one could not combine the teachings of Wise et al. and Rounbehler et al., but that there is no motivation such that one would desire to combine the teachings. Applicants acknowledge that, given suitable teachings and motivation, one of ordinary skill in the art can make many modifications regarding power requirements to various devices. However, the key is the motivation and desirability of making those modifications. Wise et al. and Rounbehler et al. do not provide any such motivation, and the Examiner's only assertion of motivation is a statement in Rounbehler et al. regarding what their device is capable of doing. Applicants submit that even when the individual elements of a claim are found in various pieces of prior art, the Examiner must still provide a reason why one of ordinary skill in the art would have been motivated to make the combination. Applicants submit that in view of the significantly faster heating required

for the concentrators of Rounbehler et al., one of ordinary skill in the art would not be motivated to add a concentrator as taught by Rounbehler et al. to the low-power, battery-operated device taught by Wise et al.

Additionally, Applicants submit that even if one were to combine the teachings of Wise et al., Rounbehler et al., and Philips et al., there is no reasonable expectation of success in making such a combination. As stated above, Wise et al. teach a low-power, battery-operated device that achieves an increase in temperature of 100C in 200 seconds, whereas Rounbehler et al. teach a device that appears to require an increase in temperature from 10C to 250C in one second. It is not clear how concentrators such as those disclosed by Rounbehler et al., apparently requiring very rapid heating, would be incorporated into a device such as that disclosed by Wise et al. The Examiner asserts that the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference, but rather what the references would have suggested to one of ordinary skill in the art. Applicants submit that the Wise et al. and Rounbehler et al. references appear to teach significantly different heating and timing requirements, and that one of ordinary skill in the art, upon reading both Wise et al. and Rounbehler et al., would have no motivation or reasonable expectation of success in attempting to combine the teachings. It would appear that, in order to incorporate the overall teaching of Rounbehler et al. of using concentrators for the Examiner's asserted advantage of permitting rapid concentration of vapors, would require the very rapid heating disclosed by Rounbehler et al. As Wise et al. already teach a multi-stage pre-concentrator 28 in a device that is low-power and battery-operated, there does not appear to be any expectation of success in modifying such a low-power, battery-operated device to achieve the very rapid heating apparently required by the concentrators of Rounbehler et al. Further, there does not appear to be any reasonable expectation of success in adding concentrators that appear to require very rapid heating, such as those disclosed by Rounbehler et al., to the device of Wise et al. that already includes a multi-stage pre-concentrator.

It appears that the Examiner is asserting that one of ordinary skill in the art would have been motivated to modify the system of Wise et al. with the teachings of Rounbehler et al.

because doing so would have been possible for the skilled artisan. The Examiner's asserted reason of combining the references "to permit rapid concentration of vapors" would appear to already be provided by the system of Wise et al. Thus any combination of Wise et al. and Rounbehler et al. would appear to result in the duplication of elements. Applicants submit that duplicating an element or function would not appear to provide the necessary motivation for combining references and establishing a *prima facie* case of obviousness. Further, the mere fact that one of ordinary skill in the art could add a concentrator according to Rounbehler et al. to perform the same function as the elements already taught by Wise et al., does not provide the necessary motivation or suggestion to make such a combination.

The Examiner asserts that one of ordinary skill in the art would be well aware of any type of power source and its subsequent employment in any fashion, and that simply because one reference uses low-power and another appears to use a higher power is not sufficient to negate their combination. Applicants respectfully disagree. As the Examiner states, the test for obviousness is what the references would have suggested to one of ordinary skill in the art. MPEP 2143.01 clearly states that the mere fact that references can be combined does not satisfy the motivational requirement for a *prima facie* obviousness rejection. While one of ordinary skill in the art may be well aware of both low- and high-power systems for heating, Applicants submit that the Examiner must still provide motivation for why one of ordinary skill in the art would have been motivated to make the asserted modification. In the absence of any asserted reasoning, logic, or suggestion for making the asserted modification, the only source appears to be the instant specification, which is improper. Applicants submit that, while one of ordinary skill in the art may understand that the low-power, battery-operated device of Wise et al. could be modified to include the concentrator and a very fast, high-power heating device required by the concentrator, as taught by Rounbehler et al., there is no indication of why one would make such a combination. Wise et al. already teaches a pre-concentrator in their device. Applicants are merely requesting the Examiner to provide some indication of why one would have desired to modify Wise et al. with Rounbehler et al.

Additionally, it appears that modifying the low-power, battery-operated device of Wise et al. to include the concentrator of Rounbehler et al. may result in an inoperative device because the power and very rapid heating requirements of Rounbehler et al.'s concentrator do not appear to be met by the low-power, battery-operated device of Wise et al. Alternatively, it would appear that further modifications to the device of Wise et al. would be required in order to achieve the very rapid heating required by the concentrator of Rounbehler et al., which would appear to destroy the low-power, battery-operated portability of the Wise et al. device. Applicants submit that neither Wise et al. nor Rounbehler et al. provide motivation for their combination, and actually teach away from such a combination. The only motivation appears to come from Applicants' own specification, which is improper.

Philips et al. teach a two-dimensional chromatography system in which thermal modulation is used to focus, refocus and accelerate a concentration pulse through two dimensions to separate chemical components of a sample. See column 4, lines 38-59. Loss of orthogonality is important in the two-dimensional chromatography of Philips et al. Orthogonality relates to intersecting or things lying at right angles, which is important and relevant to the two-dimensional chromatography of Phillips et al., but does not appear to have any relation or importance to the systems of Wise et al. or Rounbehler et al. The gas chromatographs of Wise et al. and Rounbehler et al. do not, however, involve a two-dimensional separation, thus the Examiner's asserted motivation for combining Philips et al. with Wise et al. and Rounbehler et al. is clearly based on Applicants' specification, which is improper. The methodologies and systems of Wise et al. and Philips et al. are vastly different and Applicants submit that there is no motivation for combining their teachings.

The Examiner states that Applicants have attempted to focus on the "orthogonality" portion of the motivational statement without any recognition of the portion that states "to provide thermal modulation to accumulate and focus, refocus and then accelerate a concentration pulse in the carrier stream." Applicants were merely responding to the Examiner's asserted motivational statement that providing thermal modulation to accumulate and focus, refocus and then accelerate a concentration pulse in the carrier stream without the loss of orthogonality, as

taught by Philips et al., would motivate one of ordinary skill in the art to combine the teachings of Wise et al., Rounbehler et al., and Philips et al. While Philips et al. do teach focusing and refocusing and accelerating a concentration pulse, this is accomplished by the two-dimensional separation specifically taught by Philips et al. Applicants submit that the advantages taught by Philips et al. appear to be related to the multi-dimensional separation taught by Philips et al.

Independent claim 21, as amended, recites:

> 21. (Currently Amended) A fluid analyzer comprising:
> a pre-concentrator having a plurality of parallel channels, the channels having an adsorbing film length of less then 1.0 cm;
> a concentrator connected to the pre-concentrator;
> a first separator connected to the concentrator; and
> a controller connected to the pre-concentrator, the concentrator, and the first separator, the controller configured to activate and de-activate the pre-concentrator, concentrator, and first separator independently.

None of Wise et al., Rounbehler et al., or Philips et al. appear to teach such a device. Wise et al. appears to teach a single long channel:

> FIG. 5 shows the thermal time constants of the two structures for three different cross-sectional areas. As can be seen, if the two structures have identical channel dimensions of 150 μm (wide)x250 μm (deep)x6 m (long) and are designed to achieve a temperature rise of 100° C. at 10 mW of operating power, the glass-bonded channel shows a time constant of 154 min whereas the corresponding value for the CVD-sealed column is 12.5 min.
>
> ...
> Moreover, due to the long channel used in GC applications, the structure tends to have a high mass, and hence the thermal capacitance is large. As a result, the thermal response time is very large, both in heating-up and in cooling-down. For instance, as shown in FIG. 5, the response time exceeds one hour for a channel with the dimensions of 150 μmx250 μmx6 m. Here, two solutions are introduced, which address the heating and cooling response times separately.

See column 5, lines 19-26 and column 6, lines 52-60. Wise et al. goes on to discuss solutions involving using two heaters at the inlet and outlet ports of each zone, and employing another structure consisting of an array of individual movable plates for cool-down. See column 6, lines

61-63 and column 7, lines 29-33. Wise et al. thus appear to teach a long (6 m) channel, and advantages associated therewith. There is no motivation for one of ordinary skill in the art to modify the device of Wise et al. to achieve the device as claimed.

Independent claim 27, as amended, recites:

> 27. (Currently Amended) A fluid analyzer comprising:
> a pre-concentrator having a plurality of parallel channels;
> a concentrator connected to the pre-concentrator;
> a first separator connected to the concentrator;
> a first plurality of heater elements in the channels of the pre-concentrator; and
> a controller connected to the heater elements, the controller configured to energize the heater elements in a time phased sequence such that each of the plurality of heater elements becomes heated and desorbs selected constituents into a sample fluid stream at about a time when an upstream concentration pulse, produced by one or more upstream heater elements, reaches the heater element, providing a concentrated heat pulse.

None of Wise et al., Rounbehler et al., or Philips et al. appear to teach or suggest such a device. Further, there is no motivation for one of ordinary skill in the art to modify the references to achieve the device as claimed.

Regarding the rejection of claims 6-8, 22, 23, 26, and 31, the Examiner asserts that the employment of multiple pumps and detectors at any desired location of a fluid analyzer "would be considered well within the skill set of one of ordinary skill in the art" (see page 9, lines 4-5 of Office Action mailed December 8, 2006). The Examiner's assertion of obviousness is based on improper grounds. MPEP 2143.01 IV states:

> A statement that modifications of the prior art to meet the claimed invention would have been "'well within the ordinary skill of the art at the time the claimed invention was made'" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). See also *In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1318 (Fed. Cir. 2000) (Court reversed obviousness rejection involving technologically simple concept because there was no finding as to the principle or specific understanding within the knowledge of a skilled artisan that would have motivated the skilled artisan to make the claimed invention); *Al-Site*

> *Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999) (The level of skill in the art cannot be relied upon to provide the suggestion to combine references.).

Emphasis added. If this rejection is maintained, the Examiner is respectfully requested to provide some objective reason to combine the teachings of Wise et al., Rounbehler et al., and Phillips et al., other than merely that such a combination could be achieved because it is "well within the skill set of one of ordinary skill in the art".

Applicants submit that there is no motivation to combine the teachings of Wise et al. with either Rounbehler et al. or Philips et al., and that even if one were to make such a combination, the resulting device would not appear to operate as taught by Wise et al. Additionally, such a combination would not result in the device presently claimed. Reconsideration and withdrawal of the rejection are respectfully requested.

Reconsideration and reexamination are respectfully requested. It is submitted that, in light of the above remarks, all pending claims are now in condition for allowance. If a telephone interview would be of assistance, please contact the undersigned attorney at 612-677-9050.

Respectfully submitted,

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